

MA20S Unit 7: SYSTEMS OF LINEAR EQUATIONS

OUTCOMES:

- Solve a system of linear equations graphically
- Solve a system of linear equations using substitution
- Solve a system of linear equations using elimination
- Describe properties of systems of linear equations
- Solve word problems involving systems of linear equations

FLIPPED CLASSROOM UNIT OUTLINE

Day 1:

- Work through “definition of a system, solving systems graphically” notes by watching video with students.
- Have students open applet on laptops.
- Watch video on how to use applet.
- Student work through 3-4 examples using the applet. They should show their work on paper.

HOMEWORK: Notes on Substitution

Day 2:

- Group students into 4-5. Work on Joke #62.
- (For kids who did not watch the video, have them read through pages 416-424)
- 20 mins before the end of class, have student complete the Knowledge Verification Questions.

HOMEWORK: Notes on Elimination

Day 3:

- Group students into 4-5. Work on Joke #64 & 65.
- (For kids who did not watch the video, have them read through pages 428-437)
- 20 mins before the end of class, have student complete the Knowledge Verification Questions.

HOMEWORK: Notes on Properties of Systems

Day 4:

- Page 448-449 # 6,7,8, 10, 11, 12, 19, 20, 22
- (For kids who did not watch the video, have them read through pages 442-447)
- 20 mins before the end of class, have student complete the Knowledge Verification Questions.

HOMEWORK: Notes on Solving Word Problems

Day 5:

- Group students into 4-5. Work on Worksheets 166 & 168

Day 6:

- Quiz
- Copy test outline
- Complete Unit Summary Sheet

Day 7:

- Correct quiz
- Unit review: pages 452-454 #7, 10-13, 15, 16, 18, 20

Day 8:

- TEST

Unit 7 Notes: SYSTEMS OF LINEAR EQUATIONS

OUTCOMES:

- Solve a system of linear equations graphically
- Solve a system of linear equations using substitution
- Solve a system of linear equations using elimination
- Describe properties of systems of linear equations
- Solve word problems involving systems of linear equations

A system of linear equations _____

Ex:

The **solution** of the system is where the lines _____.

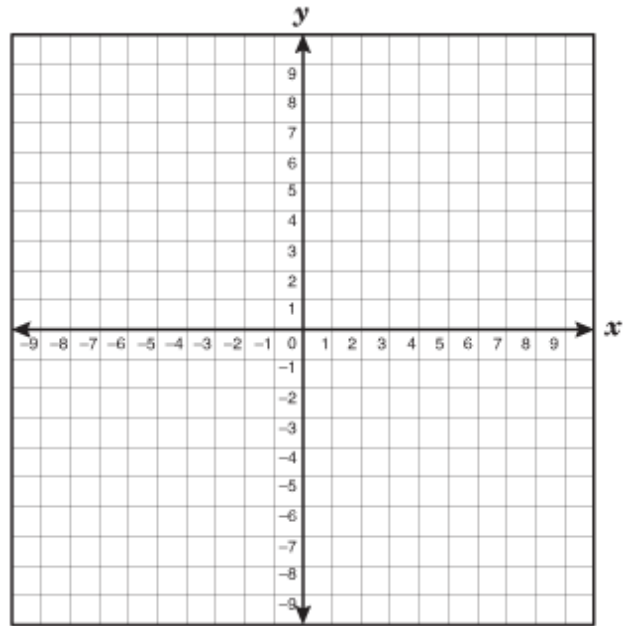
Day 1: SOLVING A SYSTEM OF LINEAR EQUATIONS GRAPHICALLY



Watch following video and complete the notes below:

<http://www.youtube.com/watch?v=sS0BVEvVmlQ>

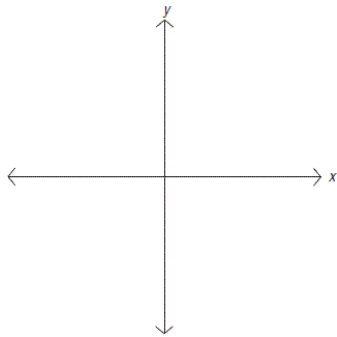
Ex: $x + y = 1$
 $x - y = -5$



Write out the method in your own words:

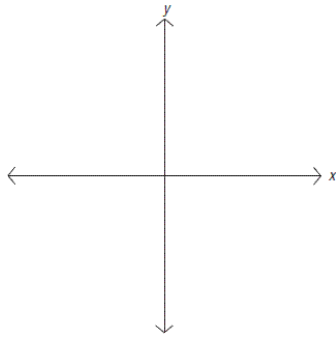


There are 3 types of Systems:



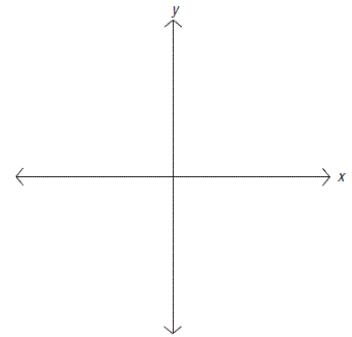
of solutions: _____

Name of system:



of solutions: _____

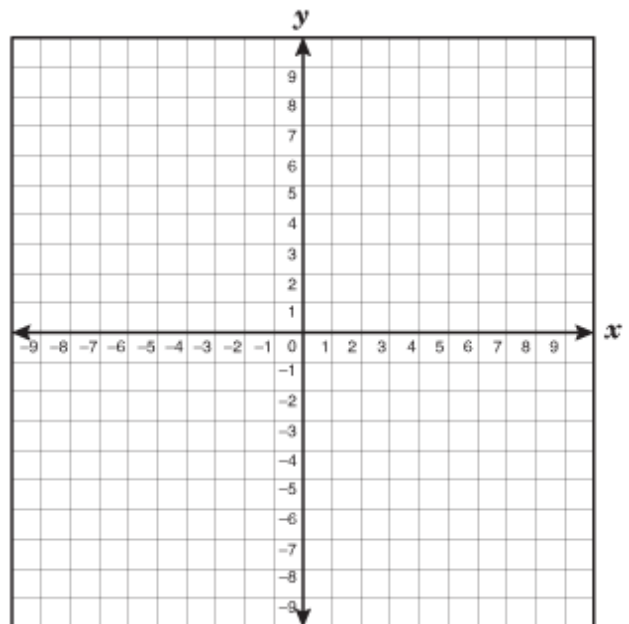
Name of system:



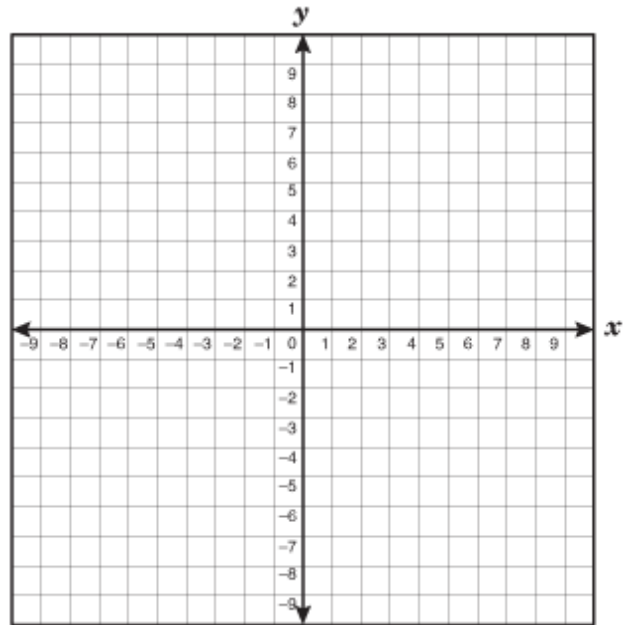
of solutions: _____

Name of system:

Ex: $y = 2x - 4$
 $y = \frac{-1}{2}x + 1$



Ex: $2x + 3y = 6$
 $y = \frac{-2}{3}x - 2$



Open the following applet:

https://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/systems-through-examples/e/graphing_systems_of_equations

How to use the applet:

<http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/v/solving-systems-graphically>



Day 1 evening: SOLVING A SYSTEM USING SUBSTITUTION



Watch following video and complete the notes below:

http://www.youtube.com/watch?v=cwHR_B9zK7k

If a system of linear equations crosses once, how many solutions will there be?

If the system has two lines that are parallel, what do you know about the number of solutions?

If the system has two equations that end up being the exact same line, what do you know about the number of solutions?

Ex: $2x + 4y = 4$
 $y = x - 2$



Write out the method in your own words:



Ex: $x + 3y = 6$
 $2x + 6y = -12$

Ex: $2x - 3y = 6$
 $4x - 6y = 12$



Open the following applet and try two questions on your own. Show your work below.

http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/systems_of_equations_with_substitution

(If you are not sure how to use the applet, watch the following video first.)

<http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/v/practice-using-substitution-for-systems>



Day 2 evening: SOLVING A SYSTEM USING ELIMINATION (ADDITION-SUBTRACTION)



Watch following video and complete the notes below (start at 1:29):

<http://www.youtube.com/watch?v=ej25myhYcSg>

Ex: $2x + 3y = 4$
 $-2x + 7y = 16$



Write out the method in your own words:

Ex: $x - 3y = 6$
 $4x - 3y = 10$

Ex: $2x = -6y + 8$
 $3x - 5y = 2$



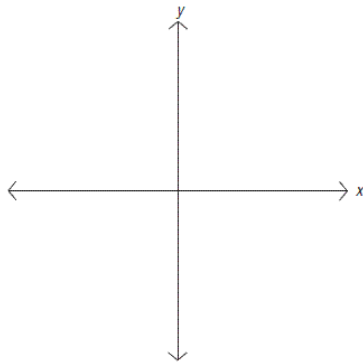
Open the following applet and try two questions on your own. Show your work below.

[http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/systems of equations with elimination](http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/systems_of_equations_with_elimination)

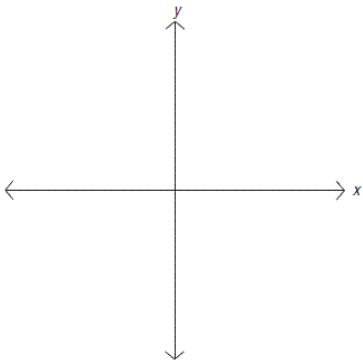


Day 3 evening: PROPERTIES OF SYSTEMS OF LINEAR EQUATIONS

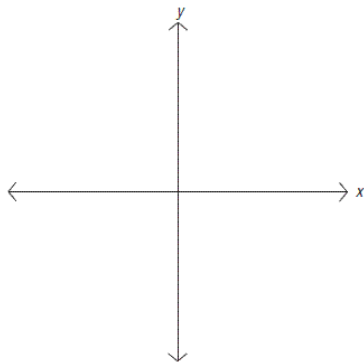
An ***inconsistent (or incompatible)*** system of linear equations is when there is no solution. Draw an example of an inconsistent system below:



A ***dependent*** system of linear equations is when there are infinite solutions. Draw an example of an inconsistent system below:



An ***independent*** system of linear equations is when there is one solution. Draw an example of an inconsistent system below:



Check your drawing above using this website:

<http://www.algebra.com/algebra/homework/coordinate/Types-of-systems-inconsistent-dependent-independent.lesson>

Find in the blanks below using the same website:

If you try to solve an incompatible system algebraically, you'll end up with something

That is not true, such as _____ .

If you try to solve a dependent system algebraically, you'll end up with something

that is true, such as _____ .

Type of system:	The solution leads to:	The equations will have:
INDEPENDENT		
INCONSISTANT		
DEPENDENT		

Open the following applet and try four questions on your own. Show your work below.

[http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/solutions to systems of equations](http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/solutions_to_systems_of_equations)



Day 4 evening: SOLVING WORD PROBLEMS
INVOLVING SYSTEMS OF LINEAR EQUATIONS



Watch following video and complete the notes below:

<http://www.youtube.com/watch?v=GTolSAXveg>

Ex: Find two numbers for which the sum is 93 and the difference is 9.

x = the first #

y = the second #

Ex: The perimeter of a rectangle is 160 yd. The width is 4 more than $\frac{1}{2}$ the length. Find the length and the width.



Ex: Sunset rents a 18 ft van for \$49.95 plus 75¢ per mile. Cactus rents a 18 ft van for \$59.95 plus 50¢ per mile. For what mileage is the cost the same?



C = cost (\$)

X = number of miles

ON YOUR OWN:

Ex: Assume all Phoenix College courses are either worth 3 or 4 credits. The cross country team is taking a total of 40 courses that are worth 144 credits. How many 3-credit courses and how many 4-credit courses are being taken?



x = _____

y = _____

Ex: Home Depot charges \$3.50 for a CF L light bulb and Supply Depot charges \$2.50 for a CFL light bulb that doesn't last quite as long. If your apartment complex lost the invoice, but knew they purchased 300 bulbs and spend \$885, how many bulbs were purchased from each store?



$x =$ _____

$y =$ _____

Ex: Grounds Works charges \$8.00/lb for premium roast coffee and \$4.50/lb for value roast coffee. How much of each type should be used to make a 10lb blend that would cost \$5.90/lb?



$x =$ _____

$y =$ _____



Check your solutions for the last three examples by watching the video below:

<http://www.youtube.com/watch?v=8yw6ra--RDE>



Need more help with word problems? Try out the applet below:

[http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/systems of equations word problems](http://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/e/systems_of_equations_word_problems)



KNOWLEDGE VERIFICATION FOR SUBSTITUTION

Solve: $3x + y = 7$
 $5x + 2y = 13$

$(1, 4)$

$$y = -3x + 7$$

$$5x + 2(-3x + 7) = 13$$

$$5x - 6x + 14 = 13$$

$$-x = -1$$

$$x = 1$$

$$y = -3(1) + 7$$

$$y = -3 + 7$$

$$y = 4$$

KNOWLEDGE VERIFICATION FOR ELIMINATION

Solve: $x - \frac{1}{3}y = \frac{4}{3}$

$$\frac{5}{6}x + \frac{1}{2}y = \frac{3}{2}$$

$$\left(\frac{3}{2}, \frac{1}{2}\right)$$

$$3x - y = 4$$

$$5x + 3y = 9$$

$$9x - 3y = 12$$

$$\underline{5x + 3y = 9}$$

$$14x = 21$$

$$x = \frac{21}{14} = \frac{3}{2}$$

$$3\left(\frac{3}{2}\right) - y = 4$$

$$\frac{9}{2} - y = 4$$

$$9 - 2y = 8$$

$$-2y = -1$$

$$1y = \frac{1}{2}$$

KNOWLEDGE VERIFICATION FOR PROPERTIES OF LINEAR SYSTEMS

a) Explain how you can tell if a system of linear equations is inconsistent.

b) Write system of linear equations that is dependent.

a) The slopes are the same but the y-intercept are different.

OR

When solving the system algebraically, you get an untrue statement such as $0 = 5$.

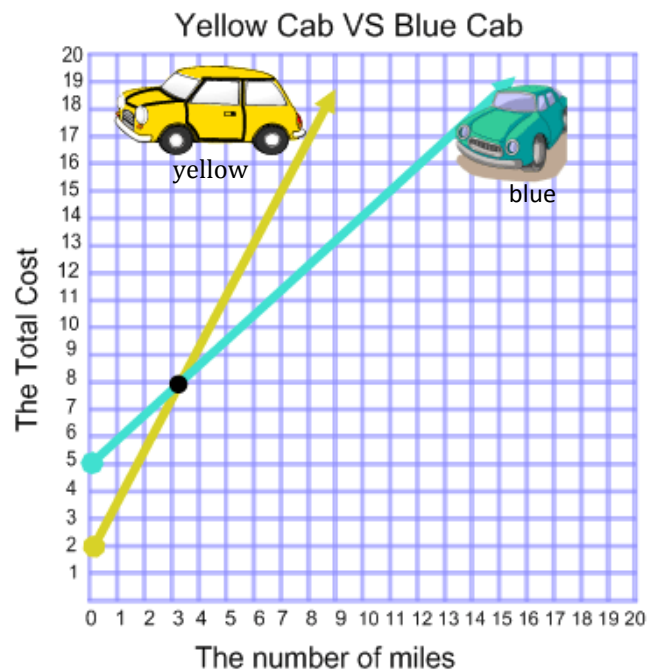
b) Any systems where one equation is a multiple of the other, such as:

$$x + y = 4$$

$$2x + 2y = 8$$

Quiz #1: SYSTEMS OF EQUATIONS
Non-Calculator
Show all work on paper.

1. Solve this system by *substitution*:
$$\begin{aligned}x + 4y &= 6 \\ 2x - y &= 3\end{aligned}$$
2. Solve this system using *elimination*:
$$\begin{aligned}4m - 3n &= 23 \\ 5n + 2m &= 5\end{aligned}$$
3. Solve this system *graphically*:
$$\begin{aligned}2x + y &= -2 \\ 3x - y &= -4\end{aligned}$$
4. This graph below shows the cost for two different cab companies. Which company would you use? Explain your answer.



UNIT 7: SYSTEMS OF EQUATIONS

Name: _____

SOLVE A SYSTEM OF LINEAR EQUATIONS GRAPHICALLY:

SOLVE A SYSTEM OF LINEAR EQUATIONS USING SUBSTITUTION:

SOLVE A SYSTEM OF LINEAR EQUATIONS USING ELIMINATION:

THREE TYPES OF SYSTEMS AND HOW TO TELL THEM APART.